



STATE OF UTAH
DEPARTMENT OF HEALTH

NORMAN H. BANGERTE, GOVERNOR

SUZANNE DANDOO, M.D., M.P.H., EXECUTIVE DIRECTOR

February 10, 1986
533-6146

RECEIVED
FEB 14 1986

Mr. Melvin R. Swanson
Kelmene Corporation
4901 York Street
P.O. Box 16043
Denver, Colorado 80216

FILE COPY
DIVISION OF
OIL, GAS & MINING

RE: Kelmene Corp. Lisbon Valley Mine
Wastewater Facilities
Plan Review

Dear Mr. Swanson:

As a result of our review of the plans submitted and the design meeting held 8 January 1986 we submit the following comments:

1. Details of the waste dump slope stabilization by terracing should be included in the plans.
2. Show how surface water diverted around the open pit mine will be disposed of.
3. Show details of how the placing of the drainage pipe under the haul road will prevent sediment from being washed down grade by surface runoff.
4. A summary of the testing information collected must be provided for review concerning the neutralization of the oxide tailings prior to their removal from the concrete leach pad. This information must acceptably substantiate the conclusion of the meeting that the tailings will be essentially a uniform sand that will allow uniform movement of the milk of lime, neutralizing liquid, through the tailings. Detail must also be provided on the pH valve the leached ore will be neutralized to and the length of time it will maintained before a pile is considered neutralized.
5. It is suggested for your consideration that if the project were modified to allow the oxide and sulfide ores to be deposited on a synthetic liner with a leak detection system and leached in lifts over the project life and then neutralized and reclaimed in place the following benefits would be realized:

KENNETH L. ALKEMA, DIRECTOR • DIVISION OF ENVIRONMENTAL HEALTH

- a. The ore would only need to be handled once as opposed to twice as is now proposed i.e. once to load the ore on the concrete leach pad and once to place it in the oxide ore tailings pile or for further leaching in the sulfide ore leach pile.
 - b. The cost of constructing the concrete leach pad with a leak detection system would be eliminated.
 - c. The need to provide aprons around the concrete leach pad to contain spillage due to loading the leached and partially leached ores would be eliminated.
 - d. The need to construct a roadway surface and aprons to contain spillage between the concrete leach pad and the sulfide ore leach pads would be eliminated.
 - e. The need to provide long term operation efforts to clean up spillage on the haul road between the concrete leach pad and the sulfide ore leach pad would be eliminated.
 - f. The loss of product being hauled between the concrete leach pad and the sulfide ore leach pads would be eliminated.
 - g. The proposal would suggest that the ore be placed in lifts on a long term leach pad for leaching until the minimum economic recovery rate was achieved. The barren solution spray system would then be dismantled and a new lift of ore would be laid on top and the leaching operations would continue. This procedure would repeat itself over the life of the project. Once the project were completed the entire pile would be neutralized and then reclaimed.
 - h. Finally the potential for environmental impacts from the leaching operation would be lessened due to reducing the handling of neutralized and unneutralized leached ores. In addition the elimination of the hauling of unneutralized ores between the concrete leach pad and the sulfide leach pads would greatly reduce environmental impacts.
6. A contingency plan must be developed which will address all potential impacts of the project on the environment. The plan should include but not be limited to the mill site, process ponds, concrete leach pads, sulfide leach pads, transportation of leached ore and tailings and the storage vessels.

7. A general orientation drawing or other means of indentifying all unit processes, piping, exploration and water production wells, and storage vessels included in the project which will be approved by the construction permit should be provided.
8. The final proposed plans and details, including the material of construction for the concrete leach pads must be provided for review. Concrete or other materials to be used in long term contact with low pH fluids, must be shown to be resistant to acidic deterioration for at least the life of the project.
9. All process piping including pregnant liquor, barren solution, leak detection and leakage containment piping must be shown on the general orientation drawing mentioned in Item No. 7.
10. Provide enough dimensional and construction detail information concerning the sump which collects solutions from the concrete leach pads to evaluate its capability to function satisfactorily.
11. Details of the measures which will be taken to mitigate the potential impacts which may result from transportation of the unneutralized oxide/sulfide ore to the sulfide ore leach pads must be provided.
12. Show details of the piping arrangement for the pregnant liquor and milk of lime bleed off fluids and also identify the containment vessel for these fluids.
13. Show plans and details of the area were the oxide tailings will be deposited. Also, show what provisions are proposed to contain all precipitation from the tailings pile. The details of surface water diversion around the pile should also be shown, if that is applicable.
14. Details must be provided in an operations plan which will insure operator inspection of all leak detection systems on a daily basis. The operations plan should also reference the contingency plan for appropriate action should a leak occur.
15. Plans and details must be provided for the leak detection systems under the concrete leach pads and sulfide leach pads for review. Soils observed in these areas are unsuitable for use as a subbase in a leak detection system. New plans submitted for these pads must include and engineered subbase of 1×10^{-7} cm/sec minimum permeability.

16. Details of the containment piping or ditches which will contain any leakage or spillage from pregnant liquor, barrier solution or leak detection lines must be provided for review. Also, all piping which is protected by leakage and spillage control systems should be shown on the general orientation drawing referenced in Item No. 7. Soils observed on the site are unsuitable for use in a leakage or spillage control system. If soils are to be used for containment of leakage and spillage, these systems should be engineered with materials of 1×10^{-7} cm/sec minimum permeability.
17. After a site inspection on January 10, 1986, it has been determined that a leak detection system will be required under the process ponds.
18. A plan and details for each sulfide leach pad must be provided.
19. Plans, details and construction procedures of the proposed lap between the PVC and Hypolon liners must be provided.
20. Enough information must be provided to allow evaluation of the capability of the pregnant liquor system to contain a storm event.
21. Procedures which will be used to prevent precipitation from leaching through the sulfide ore piles once leaching operations have been completed should be provided.
22. It is recommended that a flow sheet be provided referencing all acid unit processes in the project.
23. The maximum permeability rate which is allowed by the Bureau of Water Pollution Control for clay which is to be used to provide a barrier between any leakage and the environment must have a maximum permeability rate of 10^{-7} cm/sec. It would be preferred that the existing clay source with permeability values of 10^{-9} cm/sec be used for leach detection liners as is without blending with soils of greater permeability rates. Due to the estimated life of the project being 15 years it is recommended that a minimum compacted clay thickness of (2) two feet be used. In addition any clay sources which will be used in their natural state must be evaluated and tested for integrity and continuity before approval.
24. Details of the fencing which will be provided around process ponds and other sensitive areas for protection and security should be shown.

25. Details should be provided of how spillage at the mill site, solvent extraction site, waste oil and solvent storage tank sites, concrete leach pads, sulfide leach pads, mixing vessel, conveyor belts, and storage bin will be contained and prevented from adversely impacting the environment.
26. Describe in detail the close down procedures for the process ponds.
27. All synthetic liners used to line leach areas, process ponds and storage areas must be evaluated to determine their adequacy to contain all constituents of the leaching solution and to function adequately for the construction and operational conditions proposed.
28. A detailed description of the chemical make up of polyacrilimide type flocculant and dodecylsalaldoxinme solution should be provided.
29. Detailed information concerning the size and characteristics of piping to be used throughout the site should be presented.
30. Plans and details of the process ponds must be provided for review including any berms to prevent surface water from running into the ponds.
31. In addition to standard permeability tests run on the clay liners, material permeability tests must be conducted in the presence of representative samples of the pregnant liquor and barren solution, and the results submitted for review.
32. Inspection of the proposed evaporation pond site showed that soils found there are highly permeable. If the site is to be used for evaporation a minimum 2 foot clay liner of 1×10^{-7} cm/sec will need be designed and installed.

The following is a list of basic assumptions and conclusions agreed upon in the meeting upon which the review of the project is in part based:

1. It was indicated based on the exploratory drilling conducted that there would not be a problem with ground water in the open pit mine. However, if water is encountered it was also agreed that it would be adequately contained.
2. It was concluded that the ore surge pile located north of the mixing vessel will not produce any impacts on groundwater or to the surface drainages due to it being located on a flat area of impervious rock.

Mr. Melvin R. Swanson
Page Six

3. It was agreed as a requirement that a minimum acceptable depth of clay having a permeability of 10^{-9} cm/sec would exist or be constructed under the mixing vessel, conveyor belts, storage bins, concrete leach pads, sulfide leach pads, oxide ore tailings pile, process ponds, the mill site and storage vessels.
4. It was agreed that pregnant liquors from all leaching operations would be stored in a lined and fenced pond.

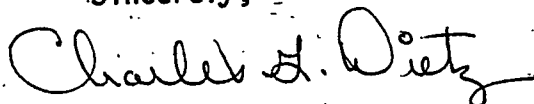
After inspection of the site it was agreed that the man-made or artificial fill can and should be mapped separately from any naturally occurring soils or surficial materials. Also, permeability of all natural and artificial surficial materials should be tested for design purposes.

We appreciate the opportunity to comment on this proposed project and to meet with Kelmene to discuss it.

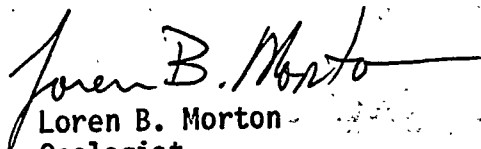
Please revise the plans and specifications according to the proceeding comments or provide additional information and submit (2) two copies to this Bureau and (1) one copy to the Southeastern District Health Department Attention Mr. David Ariotti.

Please call if there are any questions.

Sincerely,



Charles G. Dietz, P.E.
Environmental Engineer
Bureau of Water Pollution Control



Loren B. Morton
Geologist
Bureau of Water Pollution Control

CGD:jgh

cc: John Whitehead/Oil, Gas & Mining ✓
Terry McParland/BLM, Moab
Larry Dalton/Wildlife Resources, Price
David Ariotti/Southeastern District Health Dept., Price
Jim Adamson/Southeastern District Health Dept., Moab

3252-12